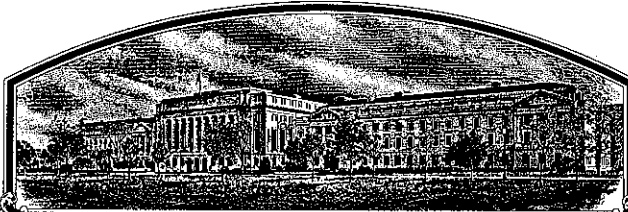


No.

9000060



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Minnesota Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Minnpro'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 31st day of January in the year of our Lord one thousand nine hundred and ninety-four.

Attest:

Kenneth H. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Mike Essey
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

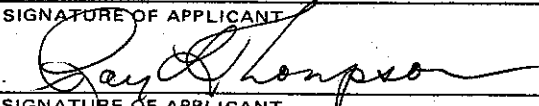
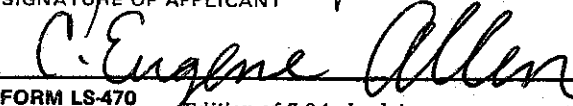
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S) Minnesota Agric. Exp. Stn.		2. TEMPORARY DESIGNATION MN 81110	3. VARIETY NAME Minnpro
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) University of Minnesota; 220 Coffey Hall 1420 Eckles Ave., St. Paul, MN 55108		5. PHONE (Include area code) (612) 625-4211	FOR OFFICIAL USE ONLY PVPO NUMBER 9000060
6. GENUS AND SPECIES NAME Triticum aestivum L.	7. FAMILY NAME (Botanical) Graminae		FILING DATE Jan. 3, 1990 TIME 1:30 <input type="checkbox"/> A.M. <input checked="" type="checkbox"/> P.M.
8. KIND NAME Hard red spring wheat	9. DATE OF DETERMINATION Feb. 15, 1989		AMOUNT FOR FILING \$ 2150.- DATE Jan. 3, 1990
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Minnesota Agric. Exp. Stn.			AMOUNT FOR CERTIFICATE \$ 250.00 DATE Jan. 5, 1994
11. IF INCORPORATED, GIVE STATE OF INCORPORATION			12. DATE OF INCORPORATION
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS R.H. Busch, Dept. of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN 55108			

PHONE (Include area code): 612-625-1975

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
- a. ☒ Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)
 - b. ☒ Exhibit B, Novelty Statement.
 - c. ☒ Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.)
 - d. ☒ Exhibit D, Additional Description of Variety.
 - e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) ☒ Yes (If "Yes," answer items 16 and 17 below) ☐ No
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ Yes ☐ No
17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? ☒ Foundation ☒ Registered ☒ Certified
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? ☐ Yes (If "Yes," give date) ☒ No
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? ☐ Yes (If "Yes," give names of countries and dates) ☒ No
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.
- The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.
- Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT 	DATE 12/12/89
SIGNATURE OF APPLICANT 	DATE 12/12/89

HARD RED SPRING WHEAT

PV Application No. 9000060 ,Wheat variety 'Minnpro' (PI532149)

13A. Exhibit A
Pedigree MN72299/MN74115

The cross MN72299/MN74115 was made in 1978 under the direction of Dr. R. Busch. The F2 and F5 were advanced in their respective nurseries, subjected to inoculated rust (leaf and stem) conditions. Selection was applied both generations for plant height, days to heading, and plant type in the F2 on an individual plant basis and in the F5 on a row basis. Other diseases such as ergot, black chaff, and leaf spots were also selected against. The F3 and F4 were advanced in the greenhouse using single seed descent with no selection except for semidwarf plant type. Minnpro originated as a head selection in the F5 nursery, with the F6 increased as a head row in the winter increase nursery in Mexico in the winter of 1980-81. This selection was designated as MN81110 for testing purposes in preliminary trials in 1981. It was tested in advanced trials from 1982-1988 in Minnesota. During testing, MN81110 was evaluated for leaf rust, stem rust, leaf spotting fungal diseases, lodging, plant height, maturity, test weight, percent protein, and milling and baking quality traits. MN81110 was not tested in 1984 but was returned to testing in 1985. It was entered in the Uniform Regional Hard Red Spring Wheat Performance Nursery as a F11 line in 1986 and was retained in the Nursery until 1988. About 250 F12 head row were grown at Weslaco, Texas in the 1986-87 winter increase and phenotypically similar rows were bulked to provide breeder seed for increase by Minnesota Crop Improvement Association. Minnpro was increased at St. Paul, Minnesota in 1987, and further increased in Brownsville, Texas winter of 1987-88. Minnpro appears uniform and stable since re-selection and purification.

13B. Exhibit B--Novelty Statement

Minnpro morphologically resembles **Vance** and **Prospect** more than most other hard red spring wheat cultivars grown in the upper midwestern USA. This was determined from an extensive morphological study that included these cultivars and they were clustered within the same similarity group. Previously, **Minnpro** had been compared to our most grown cultivars although not as similar morphologically as **Vance** and **Prospect**. **Minnpro** can be differentiated from **Vance**, **Prospect** and **Spillman** by gliadin bands. The procedure was conducted by Dr. K. Khan, Department of Cereal Science, North Dakota State University, Fargo, ND 58105 at the request of Dr. R. Busch to obtain clear and useful gels for cultivar identification. The procedure used is published (Khalil Khan, Richard Frohberg, Truman Olson, and Linda Huckle. 1989. Inheritance of Gluten Protein Components of high-protein hard red spring wheat lines derived from *Triticum turgidum* var. *dicoccoides*. Cereal Chem 66(5):397-401). Dr. Khan used PAGE gel electrophoresis to determine the gliadin fraction of the gluten protein. It is the end product of the cultivar's genetic constitution that produces the gliadin fractions. These gliadin bands are called genetic markers and are commonly used to discriminate among cultivars. They are not effected by environment, like many morphological traits which are phenotypic measures, and represent consistently repeatable genotypic differences.

Differentiation was requested by PVP between **Minnpro** and **Spillman**, released by Washington Agric. Exp. Sta. Apparently these cultivars resemble each other morphologically as indicated by the PVP search and keyout. The gel of **Spillman** is represented in gel lane 1 and **Minnpro** is in lane 2 (Figure 1a). **Spillman** is most easily differentiated from **Minnpro** in the more mobile molecular weight gliadin bands where the arrow is positioned. Two bands appear in this region in **Spillman** with none at those positions in **Minnpro**. **Prospect**, not a protected cultivar, is represented in lane 3 and differs from **Minnpro** by atleast two bands absent in the less mobile molecular weights (see arrows, Figure 1a) and possesses an additional three bands in the more mobile molecular weights. **Vance** is easily distinguished from **Minnpro** because it lacks a two bands in the less mobile molecular weights (see arrows) and possesses two additional bands in the more mobile molecular weights, as did **Prospect** (see arrows, Figure 1a). Therefore, all wheats are distinguishable uniquely from each other using gliadin banding. This procedure is highly repeatable and provides excellent genetic discrimination among cultivars.

Wheat storage proteins were also used to differentiate among **Marshall**, **Vance** and **Minnpro** by analyzing their PAGE (gliadin) and SDS-PAGE (glutenins) electrophoretic patterns. **Minnpro** samples were identical by both electrophoretic techniques with no evidence of different biotypes. The cultivar appears

similar to Marshall but is distinctly different in the high mobility region. Minnpro differs from Vance in both the high and low mobility regions with several banding pattern differences (see Figures 1 & 2 supplied by W. Bushuk, Food Sci. Dept., Univ. of Winnipeg. Reference- P.K.W. Ng and W. Bushuk. 1987. Glutenin of Marquis wheat as a reference for estimating molecular weights of glutenin subunits by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. Cereal Chem. 64:324).

13D. Exhibit D. Additional description of 'Minnpro'. Minnpro is a hard red spring wheat, *Triticum aestivum* L. Minnpro is high yielding and semidwarf. It is 4 cm taller than Marshall and 5 cm taller than Wheaton averaged over six locations in 1990 and 1992, and seven locations in 1989. The LSD 0.05 computed from the variety x environment interaction is 2.2 cm. It has significantly poorer lodging resistance than Marshall (lodging scale 1=erect, 9=flat) but similar to Wheaton and Vance (Minnpro= 2.8, Marshall=2.1, Wheaton=2.5, Vance=2.4; LSD0.05=0.6). Minnpro is similar in heading date to Wheaton (25 days from May 30) and earlier than Marshall (26 days, LSD=0.05=0.7). Minnpro has high protein content, at least 2 (LSD0.05=0.7) percentage points higher in protein than Marshall, Wheaton and Era (See Tables 1 & 2 from 1990 edition of Varietal Trials of Farm Crops, Minn. Agric. Exp. Sta., Misc. Report 24).

Minnpro has yellow colored anthers and the auricles, when viewed through magnification has hairs. The spike is fusiform to oblong, and mid-dense. The glumes are glabrous and white, shoulders are mid-wide and apiculate, and beaks are tapering and mid-long. The kernel shape is ovate, mid-size, with rounded cheeks, and the crease mid-wide and deep. The brush is mid-size to small and mid-long.

Minnpro has been highly resistant to all tested races of stem rust both in the field nursery tests and in the greenhouse in seedling growth stage. Minnpro has also been resistant to all naturally occurring leaf rust race in adult field tests. Race tests of Minnpro have indicated that it possesses at least Lr13 and Lr34 adult plant leaf rust resistant genes.

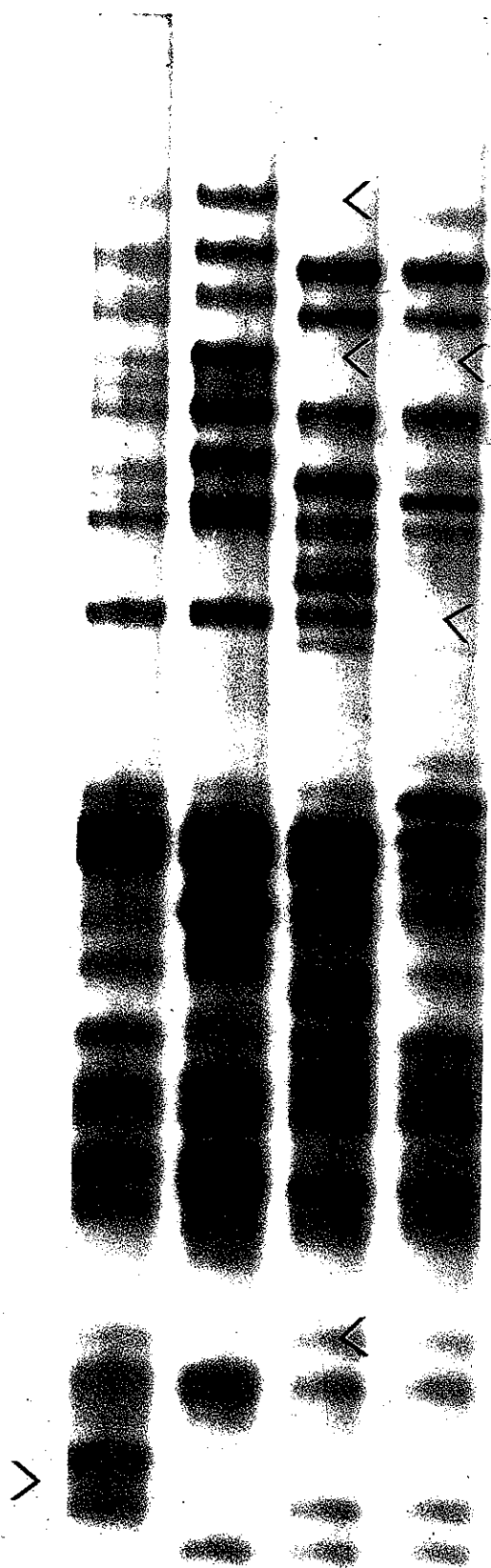
E. Area of adaptation and primary use (quality) of the cultivar.

Minnpro is suited for production in Minnesota, North Dakota, and northern South Dakota. Grain produced in these areas will be used primarily for bread-making.

G. The Minnesota Crop Improvement Association will maintain Breeder and Foundation seed of Minnpro. Generations of Minnpro permitted in Minnesota are Foundation, Registered, and Certified.

H. The cultivar Minnpro will be constituted from breeder seed and processed through Foundation, Registered, and Certified classes in succeeding generations. A supply of breeder's seed is maintained in cold storage for use in an emergency. Foundation seed is produced from Foundation as long as the characteristics satisfy the original breeder's description.

9000060



SPILLMAN
MINNPRO
'ROSPECT
VANCE

Fig. 1A Gliadins

Table 1. Characteristics of hard red spring wheat varieties, 1987-89

Variety	Heading date	Height inches	Lodging score ¹	Rust reaction		Seeds no./lb	Test weight lbs/bu	Protein % ³	Milling baking quality
				leaf	stem				
PUBLICLY DEVELOPED VARIETIES									
				--	rating ²	--			rating
Butte 86	6-14	27	3	MR	R	13,800	60.3	14.8	Medium-High
Prospect	6-17	26	1	MR	MR	14,300	60.0	14.6	Medium-Low
Minnpro	6-18	25	2	R	R	13,600	57.8	16.4	High-Medium
Stoa	6-18	30	2	MR	R	14,900	59.6	14.7	Medium-High
Wheaton	6-18	23	1	R	R	14,100	57.8	14.1	Low-Medium
Marshall	6-19	24	1	MR	R	15,600	59.3	14.4	Medium-Low
Vance	6-19	25	1	R	R	14,400	58.5	14.8	Medium-High
Shield	6-14	28	2	R	MS	13,500	59.1	14.6	Medium
Guard	6-16	25	1	R	MR	14,800	59.8	14.4	Medium-Low
Amidon	6-18	31	2	R	R	15,200	59.9	15.0	High-Medium
Chris	6-18	30	3	MR	R	16,600	59.4	15.8	Very High
Grandin ⁴	6-18	26	1	MS	R	14,400	59.5	15.2	High
Len	6-19	26	1	MS	R	14,800	59.4	15.6	High-Medium
Era	6-21	24	1	MR	R	15,900	59.5	13.9	Low-Medium
PRIVATELY DEVELOPED VARIETIES									
2385	6-15	27	1	R	MS	14,100	59.2	15.2	Medium
2375 ⁴	6-17	28	2	MR	R	13,800	60.4	15.6	Medium
2369	6-17	25	1	MS	MR	13,600	59.8	15.0	Low-Medium
Celtic	6-18	27	1	R	R	13,700	59.2	15.0	Medium
Fjeld ⁴	6-18	25	1	MS	R	14,400	58.9	14.2	Low-Medium
Telemark	6-18	23	1	R	R	14,700	58.1	15.2	High-Medium
Leif	6-18	27	2	R	R	14,800	59.6	15.4	Medium
A99 AR	6-19	30	2	MS	R	11,900	54.6	15.2	Low
Nordic	6-19	26	1	MS	R	12,700	60.4	13.6	Low
Norseman	6-19	23	1	R	R,S	13,900	58.2	15.1	Medium-Low
Tammy	6-19	26	2	MS	S	12,900	58.9	15.0	Medium-Low

¹1 = erect, 9 = flat; ²Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible; 312 percent moisture; 42 years data.

Table 2. Yields of hard red spring wheat varieties, 1987-89

Variety	Crookston	Stephen	Roseau ¹	Northern average	St. Paul	Morris	Lamberton	Waseca	Southern average	State average
----- bu/A -----										
PUBLICLY DEVELOPED VARIETIES										
Butte 86	43	50	46	46	39	40	29	38	37	40
Prospect	39	51	42	44	39	36	36	41	38	40
Minnpro	41	46	50	45	36	33	32	32	33	37
Stoa	46	53	54	51	38	41	39	42	40	43
Wheaton	42	55	41	47	37	41	38	36	38	41
Marshall	43	50	38	44	34	37	36	34	35	38
Vance	42	51	43	46	38	36	31	34	35	38
Shield	37	38	49	41	42	40	42	42	41	40
Guard	42	49	38	43	40	38	39	34	38	39
Amidon	44	49	42	46	34	36	30	35	34	38
Chris	33	37	36	35	28	32	28	30	29	31
Grandin ²	41	53	37	44	39	35	32	34	35	38
Len	42	47	40	43	30	32	31	30	31	35
Era	43	52	37	45	33	32	32	33	32	36
PRIVATELY DEVELOPED VARIETIES										
2385	34	42	40	38	36	36	32	32	34	35
23752	42	51	50	48	43	40	39	39	40	43
2369	38	49	42	43	38	36	34	35	36	38
Celtic	43	48	41	44	38	36	33	37	36	39
Fjeld ²	41	52	37	43	40	39	38	37	39	40
Telemark	40	51	36	43	36	36	34	38	36	38
Leif	43	48	32	42	33	29	30	34	32	35
A99 AR	32	47	43	41	32	34	26	31	31	34
Nordic	44	56	43	48	37	39	38	39	38	42
Norseman	45	49	43	46	36	35	36	34	35	39
Tammy	41	53	46	47	38	31	33	32	33	38
LSD 5%	6	7	7	5	6	6	8	6	3	3

¹ 1987, 1989. ² 1988-89. Data adjusted to 3-year average.

90000060

8

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (TRITICUM SPP.)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S) Minnesota Agricultural Experiment Station	FOR OFFICIAL USE ONLY PVPO NUMBER 9000060
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) University of Minnesota, 220 Coffey Hall St. Paul, MN 55108	VARIETY NAME OR TEMPORARY DESIGNATION Minnpro (MN81110)

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. or) when number is either 99 or less or 9 or less.

1. KIND:

1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

1 = SPRING 2 = WINTER 3 = OTHER (Specify) 1 = SOFT 2 = HARD 3 = OTHER (Specify)

1 = WHITE 2 = RED 3 = OTHER (Specify)

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

FIRST FLOWERING LAST FLOWERING

4. MATURITY (50% Flowering):

NO. OF DAYS EARLIER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS
 NO. OF DAYS LATER THAN 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

CM. HIGH
 CM. TALLER THAN
 CM. SHORTER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS
4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHUR COLOR:

1 = YELLOW 2 = PURPLE

8. STEM:

Anthocyanin: 1 = ABSENT 2 = PRESENT Waxy bloom: 1 = ABSENT 2 = PRESENT
 Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT Internodes: 1 = HOLLOW 2 = SOLID
 NO. OF NODES (Originating from node above ground) CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

Anthocyanin: 1 = ABSENT 2 = PRESENT Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (Specify): Flag leaf: 1 = NOT TWISTED 2 = TWISTED
 Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
 MM. LEAF WIDTH (First leaf below flag leaf) CM. LEAF LENGTH (First leaf below flag leaf)

11. HEAD:

☐ 2 Density: 1 = LAX 2 = DENSE

☐ 1 Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE
4 = OTHER (Specify) _____

☐ 4 Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

☐ 1 Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED
5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

☐ 1 ☐ 0 CM. LENGTH ☐ 1 ☐ 6 MM. WIDTH

12. GLUMES AT MATURITY:

☐ 3 Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)
☐ 2 Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

☐ 6 Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE
☐ 3 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

☐ 1 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

☐ 1 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

☐ 2 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

☐ 1 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL ☐ 1 Cheek: 1 = ROUNDED 2 = ANGULAR

☐ 2 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG ☐ 1 Brush: 1 = NOT COLLARED 2 = COLLARED

☐ Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

☐ 3 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

☐ 0 ☐ 6 MM. LENGTH ☐ 0 ☐ 3 MM. WIDTH ☐ 3 ☐ 5 GM. PER 1000 SEEDS

17. SEED CREASE:

☐ 3 Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'
☐ 3 Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 2 STEM RUST (Races) All prevalent races ☐ 2 LEAF RUST Contains at least LR13, LR34 genes
☐ 0 POWDERY MILDEW ☐ 0 BUNT ☐ STRIPE RUST (Races) ☐ 1 LOOSE SMUT
☐ OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 0 SAWFLY ☐ 0 APHID (Bydv.) ☐ 0 GREEN BUG ☐ 0 CEREAL LEAF BEETLE
☐ OTHER (Specify) _____ HESSIAN FLY RACES: ☐ 1 GP ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

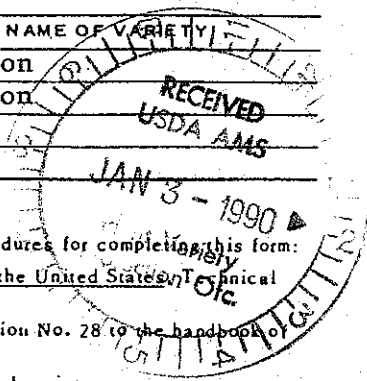
CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Wheaton	Seed size	Wheaton
Leaf size	Wheaton	Seed shape	Wheaton
Leaf color	Era	Coleoptile elongation	Era
Leaf carriage	Era	Seedling pigmentation	Era

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

- (a) L.W. Briggie and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.
- (b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.



13D. Exhibit D. Additional description of 'Minnpro'. Minnpro is a hard red spring wheat, *Triticum aestivum* L.

Minnpro is high yielding and semidwarf, similar to 'Wheaton', 'Era', and Marshall wheats, but about 4 cm taller, averaged over 3 years, 7 location per year. It has somewhat poorer lodging resistance than Marshall but similar to Wheaton and Era, with test weight similar to Wheaton. Minnpro is similar in heading date to Wheaton. Minnpro can most easily be identified by its protein content, since it is at least 2 percentage points higher in protein than Marshall, Wheaton and Era (See tables 1 & 2 from 1990 edition of Varietal Trials of Farm Crops, Minn. Agric. Exp. Sta., Misc. Report 24).

Minnpro has larger seed (by weight) than Marshall and Era. Minnpro has yellow colored anthers and the auricles, when viewed through magnification has hairs. The spike is fusiform to oblong, and mid-dense. The glumes are glabrous and white, shoulders are mid-wide and apiculate, and beaks are tapering and mid-long. The kernel shape is ovate, mid-size, with rounded cheeks, and the crease mid-wide and deep. The brush is mid-size to small and mid-long.

Wheat storage proteins of Marshall, Vance and Minnpro were compared by analyzing their PAGE (gliadins) and SDS-PAGE (glutenins) electrophoretic patterns. Minnpro samples were identical by both electrophoretic techniques with no evidence of different biotypes. The variety appears similar to Marshall but is distinctly different in the high mobility region. Minnpro differs from Vance in both the high and low mobility regions with several banding pattern differences.

Minnpro has been highly resistant to all tested races of stem rust both in the field nursery tests and in the greenhouse in seedling growth stage. Minnpro has also been resistant to all naturally occurring leaf rust race in adult field tests. Race tests of Minnpro have indicated that it possesses at least Lr13 and Lr34 adult plant leaf rust resistant genes.

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E. Area of adaptation and primary use (quality) of the cultivar.

Minnpro is suited for production in Minnesota, North Dakota, and northern South Dakota. Grain produced in these areas will be used primarily for bread-making.

G. The Minnesota Crop Improvement Association will maintain Breeder and Foundation seed of Minnpro. Generations of Minnpro permitted in Minnesota are Foundation, Registered, and Certified.

H. The cultivar Minnpro will be constituted from breeder seed and processed through Foundation, Registered, and Certified classes in succeeding generations. A supply of breeder's seed is maintained in cold storage for use in an emergency. Foundation seed is produced from Foundation as long as the characteristics satisfy the original breeder's description.

(PVP) Exhibit E, Statement of the Basis of Applicant's
Ownership

The parents of Minnpro were Minnesota selections which had not been released for commercial production. The cross, selection, and testing of MN81110 were all conducted by the Minnesota Agric. Exp. Station and USDA-ARS. Complete ownership of this cultivar is claimed.